

IN THE CLAIMS

Please amend the claims as reflected in the following listing of claims below.

1. (Currently Amended) An electronic device having ~~connecting means for~~
~~connecting, like a loop,~~ a main control portion connected to a ~~for controlling the~~
~~electronic device and~~ plurality of sub-processing portions, portion for controlling the
electronic device, for executing specific functions, said electronic device comprising:

a plurality of signal line~~Lines, each~~ for transmitting a test signal from said main
control portion to a ~~said~~ sub-processing portions, ~~different from said connecting means~~
~~connected like said loop;~~

a generating unit for generating predetermined packet data to said sub-processing
portion~~connecting means;~~

wherein the sub-processing portions each comprise ~~comprising~~ a receiving and
transmitting unit for, respectively, receiving said predetermined packet data and
transmitting said predetermined data to it to the next portion;

a determining unit for determining whether ~~or not~~ a fault exists at any portion in
said electronic device in accordance with whether ~~or not~~ said sub-processing
portions~~portion~~ normally receive~~[[s]]~~ said packet data transmitted from~~to~~ said main
control portion;

a transmitting unit for transmitting said test signal to said sub-processing portions
via said signal line in case that said determining unit determines that a ~~the~~ fault exists;
and

a fault portion specifying unit for specifying a fault portion in said electronic
device based on whether ~~or not~~ a test packet transferred to said main control portion ~~via~~
~~said connecting means~~ is normally received,

wherein said test packet is generated by said sub-processing portion in accordance with said test signal.

2. (Currently Amended) An electronic device having connecting means for connecting ~~in, like a~~ loop, a main control portion for controlling the electronic device and a plurality of sub-processing portions for executing specific functions, said electronic device comprising:

a signal line for transmitting a test signal from said sub-processing portions to said main control portion, different from said connecting means connected like said loop;

a generating unit for generating predetermined packet data to said connecting means;

sub-processing portions comprising a receiving and transmitting unit for receiving said packet data and transmitting it to the next portion;

a determining unit for determining whether or not a fault exists at any portion in said electronic device in accordance with whether or not said sub-processing portion normally receives said packet data transmitted to said main control portion;

a transmitting unit for transmitting a test packet to said connecting means in case that said determining unit determines that the fault exists; and

a fault portion specifying unit for specifying a fault portion of said electronic device based on a state of the test signal transmitted via the corresponding signal line from said sub-processing portions in accordance with said test packet.

3. (Currently Amended) An electronic device having ~~connecting means a main~~ control portion for controlling the device, and having a connecting means connected in a loop to ~~and a~~ plurality of sub-processing portions for executing specific functions ~~like a~~

loop, said electronic device comprising:

a signal line for transferring a test signal, arranged between said sub-processing portion and said main control portion, different from said connecting means;

a generating unit for generating predetermined packet data to said connecting means;

sub-processing portions comprising a receiving and transmitting unit for receiving said packet data and transmitting it to the next portion;

a determining unit for determining whether or not a fault exists at any portion in said electronic device in accordance with whether or not said sub-processing portion normally receives said packet data transmitted to said main control portion; and

a fault portion specifying unit for specifying a fault portion in said electronic device via the corresponding signal line between said sub-processing portion and said main control portion in case that said determining unit determines that the fault exists.

4. (Currently Amended) An electronic device according to Claim 1, wherein, in case that said determining unit determines that the fault exists, fault diagnosis is performed, starting from said sub-processing portion on the downstream of [[said]]a connecting means that connects the main control portion to the sub-processing portions.

5. (Original) An electronic device according to Claim 2, wherein, in case that said determining unit determines that the fault exists, fault diagnosis is performed, starting from said sub-processing portion on the downstream of said connecting means.

6. (Original) An electronic device according to Claims 3, wherein, in case that said determining unit determines that the fault exists, fault diagnosis is performed,

starting from said sub-processing portion on the downstream of said connecting means.

7. (New) An electronic device having a main control unit and a plurality of sub-processing units, wherein each of the main control unit and the plurality of sub-processing units includes a first bus-connecting unit for connecting a bus for data input, a second bus-connecting unit for connecting a bus for data output, and means for processing a process request packet directed to itself, and for bypassing a process request packet, directed to the other one and input from the first bus-connecting unit, to the second bus-connecting, and wherein the main control unit further includes a signal terminal for sending test signals to each of the plurality of sub-processing units, the signal terminal being directly connected to each of the plurality of the sub-processing units, and wherein upon receiving the test signal, each of the plurality of sub-processing units outputs an interrupt packet via the second bus-connecting unit, and wherein a data bus in a loop is formed that connects the main control unit and the sub-processing units, said electronic device comprising:

determining means for outputting, to the second bus-connecting unit in the main control unit, a command packet bypassed by all of the plurality of sub-processing units, and returned to the first bus-connecting unit of the main control unit, to determine whether an error exists on the data bus in the loop, and

identifying means for, in a case where an error exists, sending the test signal to each of the sub-processing units via the signal terminal of the main control unit,

wherein the identifying means determines whether the interrupt packet for the test signal has been received in order to identify a location of said error.

8. (New) An electronic device according to Claim 7, wherein, in a case where

the error is determined by said determining means, said identifying means performs the processes of sending the test signal and determining the reception of the interrupt packet from the sub-processing units in order, beginning from the sub-processing unit arranged in a downstream in the loop connection, and, thereby, identifies the error location.

9. (New) An electronic device having a main control unit and a plurality of sub-processing units, wherein each of the main control unit and the plurality of sub-processing units includes a first bus-connecting unit for connecting a bus for data input, a second bus-connecting unit for connecting a bus for data output, and means for processing a process request packet, directed to itself and input from the first bus-connecting unit, in accordance with the request, and for bypassing a process request packet, directed to the other one and input from the first bus-connecting unit, to the second bus-connecting unit, and wherein the main control unit further includes a signal terminal for test signals to be received from each of the plurality of sub-processing units, the signal terminal being directly connected to each of the plurality of the sub-connecting units, and wherein each of the plurality of sub-processing units further includes a test signal output unit for outputting a test signal to the main control unit when an interrupt packet for test has been received via the first bus-connecting unit, and wherein a data bus in a loop is formed upon the mutual connection to each of the main control unit and the plurality of sub-processing units via the each first bus-connecting unit and the each second bus-connecting unit, said electronic device comprising:

determining means for outputting, to the second bus-connecting unit in the main control unit, a command packet bypassed by all of the plurality of sub-processing units, determining whether the command packet has been received from the first bus-connecting unit of the main control unit, and for determining whether an error exists on

the data bus in the loop, and

identifying means for, in a case where the error is determined by said determining means, sending the interrupt packet for the test signal to the second bus-connecting unit of the main control unit, determining whether the interrupt packet has been received, and identifying a location of the error.

10. (New) An electronic device according to Claim 9, wherein, in a case where the error is determined by said determining means, said identifying means performs the processes of sending the interrupt packet and determining the reception of the interrupt packet to the sub-processing units in order from the sub-processing unit arranged in a downstream in the loop connection, and, thereby, identifies the error location.

11. (New) A method for diagnosing an error in an electronic device having a main control unit and a plurality of sub-processing units, wherein each of the main control unit and the plurality of sub-processing units includes a first bus-connecting unit for connecting a bus for data input, a second bus-connecting unit for connecting a bus for data output, and means for processing a process request packet, directed to itself and input from the first bus-connecting unit, in accordance with the request, and for bypassing a process request packet, directed to the other one and input from the first bus-connecting unit, to the second bus-connecting unit, and wherein the main control unit further includes a signal terminal for test signals to be sent to each of the plurality of sub-processing units, the signal terminal being directly connected to each of the plurality of the sub-connecting units, and wherein each of the plurality of sub-processing units further includes an input unit for inputting the test signal and an output unit for outputting an interrupt packet for test via the second bus-connecting unit when the test signal has been

received, and wherein a data bus in a loop is formed upon the mutual connection to each of the main control unit and the plurality of sub-processing units via the each first bus-connecting unit and the each second bus-connecting unit, said method comprising the steps of:

outputting, to the second bus-connecting unit in the main control unit, a command packet bypassed by all of the plurality of sub-processing units, determining whether the command packet has been received or not from the first bus-connecting unit of the main control unit, and for determining whether an error exists or not on the data bus in the loop, and

sending, in a case where the error is determined by said determining means, the test signal to each of the sub-processing units via the signal terminal of the main control unit, determining whether the interrupt packet for the test signal has been received or not, and identifying a location of the error.

12. (New) A method according to Claim 11, wherein, in a case where the error is determined in said determining step, said identifying step performs the processes of sending the test signal and determining the reception of the interrupt packet to the sub-processing units in order from the sub-processing unit arranged in a downstream in the loop connection, and, thereby, identifies the error location.

13. (New) A method for diagnosing an error in an electronic device having a main control unit and a plurality of sub-processing units, wherein each of the main control unit and the plurality of sub-processing units includes a first bus-connecting unit for connecting a bus for data input, a second bus-connecting unit for connecting a bus for data output, and means for processing a process request packet, directed to itself and

input from the first bus-connecting unit, in accordance with the request, and for bypassing a process request packet, directed to the other one and input from the first bus-connecting unit, to the second bus-connecting unit, and wherein the main control unit further includes a signal terminal for test signals to be received from each of the plurality of sub-processing units, the signal terminal being directly connected to each of the plurality of the sub-connecting units, and wherein each of the plurality of sub-processing units further includes a test signal output unit for outputting a test signal to the main control unit when an interrupt packet for test has been received via the first bus-connecting unit, and wherein a data bus in a loop is formed upon the mutual connection to each of the main control unit and the plurality of sub-processing units via the each first bus-connecting unit and the each second bus-connecting unit, said method comprising the steps of:

outputting, to the second bus-connecting unit in the main control unit, a command packet bypassed by all of the plurality of sub-processing units, determining whether the command packet has been received or not from the first bus-connecting unit of the main control unit, and for determining whether an error exists or not on the data bus in the loop, and

sending, in a case where the error is determined by said determining means, the interrupt packet for the test signal to the second bus-connecting unit of the main control unit, determining whether the interrupt packet has been received or not, and identifying a location of the error.

14. (New) A method according to Claim 13, wherein, in a case where the error is determined in said determining step, said identifying step performs the processes of sending the interrupt packet and determining the reception of the interrupt packet from

the sub-processing units in order from the sub-processing unit arranged in a downstream in the loop connection, and, thereby, identifies the error location.

15. (New) A program executable in a computer for executing processes corresponding to a method according to Claim 11.

16. (New) A program executable in a computer for executing processes corresponding to a method according to Claim 13.

17. (New) A method for determining the location of an error within an electronic device having a main control and first and second sub-processing units, wherein the main control unit and first sub-processing unit are coupled by a first data bus, and wherein the first and second sub-processing units are coupled by a second data bus, and the second and main sub-processing units are coupled by a third data bus, the method comprising:

generating a data packet from the main control unit via the first, second and third data buses back to the main control unit;

determining that an error exists if the data packet is not returned to the main control unit within a predetermined time;

in the case that said error exists, generating a test signal via direct connections from the main control unit to each of the first and second sub-processing units; and

transmitting a test packet from each of said sub-processing units via the second and third data buses to the main control unit in order to determine the location of said error.